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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,558	04/16/2004	Vladimir Lifshits	002139-013510US	2112

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EXAMINER	
CHUO, TONY SHENG HSIANG	
ART UNIT	PAPER NUMBER
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/826,558	LIFSHITS, VLADIMIR	
	Examiner	Art Unit	
	Tony Chuo	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 November 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11 and 13-19* is/are pending in the application.

4a) Of the above claim(s) *13-19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 November 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Claims 1-11 and 13-19 are currently pending. Claims 13-19 are withdrawn from further consideration as being drawn to a non-elected invention. Claim 12 has been cancelled. The objection to the drawings is withdrawn. The objection to the specification is withdrawn. The 112 rejections for claims 1 and 6 are withdrawn. The amended claims do not overcome the previously stated 102 and 103 rejections. Therefore, claims 1-11 stand rejected under the following 102 and 103 rejections.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 6, and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Ballantine et al (US 6740437). Regarding claim 1, the Ballantine reference teaches a method of operating a fuel cell comprising: exhausting fuel gas at an elevated temperature from the fuel cell to an oxidizer "318" that receives oxygen "314" via conduit "320" from the fuel cell stack to form a combustible anode gas mixture; heating the air

by the heat generated by the fuel cell to a temperature at which the combustible components can be catalytically oxidized; catalytically oxidizing the mixture in the oxidizer "318" to form an effluent; heating the effluent by adding a supplemental supply of oxygen to oxidize combustibles which would increase the temperature of the effluent during portions of time when the fuel cell is generating electricity; and heating the fuel cell with the effluent by feeding the effluent to a heat exchange which transfers heat back to the fuel cell by humidifying the air stream that is fed to the fuel cell (See Figure 3, column 10, lines 1-12 and 26 to 35).

Examiner's note: Ballantine et al discloses maintaining the temperature of the oxidizer at a temperature over 600°C (See column 12 lines 48-50). This implies that additional heat is added to the oxidizer to heat the air when the temperature drops below a temperature at which the combustible components can be catalytically oxidized. Further, the phrase "when a temperature of the mixture drops below a temperature at which the combustible components can be catalytically oxidized" is a conditional statement. Therefore, if the temperature of the oxidizer does not drop below a temperature at which the combustible components can be catalytically oxidized, as during steady state conditions, then the oxygen will not need to be further heated to a temperature at which combustible components can be catalytically oxidized.

Regarding claim 2, it also teaches a method of operating a fuel cell comprising generating an air flow, heating the air flow by the heat generated by the fuel cell, and mixing the air flow with the anode gas to form a mixture (See column 10, lines 1-10).

Regarding claim 6, it also teaches a method of operating a fuel cell comprising adding a supplemental supply of oxygen to ensure adequate oxygen to oxidize combustibles in the fuel exhaust (See column 10, lines 7-10). By doing so, the heat output that is generated by the oxidizer to heat the oxygen is modulated to compensate for variations in the proportion of combustible components in the anode gas.

Regarding claim 7, it also teaches method of operating a fuel cell comprising independently modulating the heat output during heating the oxygen and a heat output generated for heating the effluent by modulating the heat output of the fuel cell that is used to heat the oxygen independently from the supplemental supply of oxygen that is used to heat the oxidizer effluent (See column 9 lines 65-67 and column 10 lines 8-10).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 3-5 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ballantine et al (US 6740437) in view of Haltiner, Jr. et al (US 6967064). The Ballantine reference is applied to claims 1, 2, 6, and 7 for reasons stated above.

However, Ballantine et al does not expressly teach exchanging heat between the air flow and anode gas prior to mixing the air flow with the anode gas wherein exchanging heat comprises forming a first and second flow path for the anode gas and

the air flow and separating the flow paths by a heat exchange medium to transfer heat between the anode gas and the air flow so that the temperatures of the anode gas and the air flow become more equal, and thereafter merging the anode gas and air flow to form a mixture, and selecting a length of the flow paths so that substantially no portions of the mixture are above an auto-ignition temperature of the combustible components in the anode gas at a predetermined highest temperature of the anode gas encountered during the operation of the fuel cell. The Haltiner, Jr. reference teaches exchanging heat between the reformate which is the anode gas and the air flow in a co-flow heat exchanger "124" comprising a sinusoidal tube "138" for conveying the reformate and a chamber which air passes through (See column 4 line 64 to column 5 line 9).

Examiner's note: It is implicit from the teaching of Haltiner, Jr. et al that the length of the flow paths would be long enough so that no portions of the mixture would be above the auto ignition temperature of the combustible components in the anode gas in order for combustible components to be catalytically oxidized inside the oxidizer instead of inside the flow paths.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ballantine method of operating a fuel cell to include exchanging heat between the anode gas and the air flow by using a heat exchanger before the oxidizer comprising a first and second flow path for the anode gas and the air flow and separating the flow paths by a heat exchange medium to transfer heat between the anode gas and the air flow so that the temperatures of the anode gas and the air flow become more equal and thereafter merging the anode gas and air flow

to form a mixture, and selecting a length of the flow paths so that substantially no portions of the mixture are above an auto-ignition temperature of the combustible components in the anode gas at a predetermined highest temperature of the anode gas encountered during the operation of the fuel cell in order to maintain proper operation of the oxidizer by allowing the temperatures of the anode gas and air flow to become more equal.

6. Claims 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ballantine et al (US 6740437) in view of Nakanishi et al (JP 07-326379). The Ballantine reference is applied to claim 1 for reasons stated above. However, Ballantine et al does not expressly teach buffering the anode gas prior to adding oxygen to compensate for fluctuations in the proportion of the combustible components of the anode gas. The Nakanishi reference teaches buffering the anode exhaust gas by buffer layer "7" before it is exhausted to the outside of the fuel cell (See Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ballantine method of operating a fuel cell to include buffering the anode gas prior to adding oxygen to compensate for fluctuations in the proportion of the combustible components of the anode gas in order to reduce the temperature difference between the cells which would reduce the degradation of the cells.

Response to Arguments

7. Applicant's arguments filed 11/2/06 have been fully considered but they are not persuasive.

The applicant argues that the Ballantine reference fails to show or in any suggest "adding oxygen to the anode gas to form an oxidizable anode gas mixture". The examiner disagrees because Ballantine et al discloses "receiving a supplemental supply of oxygen to ensure adequate oxygen to oxidize combustibles in the fuel exhaust" (See column 10, lines 7-10).

The applicant also argues that the Ballantine reference fails to show or in any way suggest "heating the oxygen when a temperature of the mixture drops to below a temperature at which the combustible components can be catalytically oxidized to thereby give the mixture a temperature at which the combustible components catalytically oxidize". The examiner disagrees because Ballantine et al discloses maintaining the temperature of the oxidizer at a temperature over 600°C (See column 12 lines 48-50). This implies that additional heat is added to the oxidizer to heat the air when the temperature drops below a temperature at which the combustible components can be catalytically oxidized. Further, the phrase "when a temperature of the mixture drops below a temperature at which the combustible components can be catalytically oxidized" is a conditional statement. Therefore, if the temperature of the oxidizer does not drop below a temperature at which the combustible components can be catalytically oxidized, such as during steady state conditions, then the oxygen will not need to be further heated to a temperature at which combustible components can be catalytically oxidized.

The applicant also argues that the Ballantine reference fails to show or in any way suggest "catalytically oxidizing the mixture to form an effluent" and "thereafter

heating the effluent during at least portions of the time when the fuel cell generates electricity". The examiner disagrees because Ballantine et al discloses a catalytic oxidizer "318" and receiving a supplemental supply of oxygen to ensure adequate oxygen to oxidize combustibles in the fuel exhaust, thereby increasing the temperature of the effluent during portions of time when the fuel cell is generating electricity (See column 10, lines 8-10).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

JONATHAN CREPEAU
PRIMARY EXAMINER